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THE UNIVERSITY OF GEORGIA

COMPUTER SOFTWARE MANAGEMENT

AND

INFORMATION CENTER

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MONTHLY PROGRESS REPORT

APRIL, 1994

UNDER CONTRACT

NASW-4670

(NASA-CR-195809) COSMIC MONTHLY PROGRESS REPORT (COSMIC) 31 p

PREPARED FOR

TECHNOLOGY UTILIZATION OFFICE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C.

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1. GENERAL INFORMATION

Again, COSMIC experienced a low sales month in April. A study of the first four months in 1994 versus 1993 show that COSMIC sold only four less programs in 1994 over 1993 and NASA ordered only six more programs over the same time frame. The big difference is in the cancellation of licenses (STAGSC-1 & NASTRAN) as well as the lack of new licenses especially TAE licenses.

COSMIC hosted the NASTRAN Users' Colloquium in San Diego in April. COSMIC also attended the NAG Meeting.

COSMIC will exhibit at TABES 94 in Huntsville in May.

2. INVENTORY

The current inventory of programs available from COSMIC is the sum of the Class 1 and 2 programs in TABLE 1, "Issuability Status Summary." The total number of items submitted from each source since COSMIC began is given in the right hand column of TABLE 1. Numbers listed under the "Withdrawn" column reflect those packages for which return or discard authorization has been provided by the appropriate Technology Utilization Office.

TABLE 1. ISSUABILITY STATUS SUMMARY

July 1966 to Date

Center Mnemonic	Class 1	Class 2	Class 3	Class 4	In Process	With-drawn	Total
ARC	74	5	4	4	7	87	181
COS	-	28	2	3	3	87	123
DOD	-	14	4	0	0	84	102
ERL	4	0	0	0	0	16	20
FRC	1	0	2	0	0	12	15
GSC	88	1	12	11	14	347	473
HQN	19	3	0	2	1	98	123
KSC	7	1	19	2	1	91	121
LAR	172	7	39	17	15	270	520
LEW	115	9	1	19	23	304	471
MFS	50	6	0	8	14	1,352	1,430
MSC	91	14	0	22	11	1,063	1,201
NPO	113	2	2	33	14	440	604
NUC	0	1	1	0	0	73	75
SSC	4	0	1	0	0	0	5
UGA	-	4	2	0	0	13	19
TOTALS	738	95	89	121	103	4,337	5,483

The number of submittals for the current month is about the average of the past few months. The total number of receipts for this month is fifteen: eleven are initial software packages, and four are updates to packages. A summary by submittal site is shown in TABLE 2.

TABLE 2. SUMMARY OF TOTAL RECEIPTS 1994

Submittal Site	This Month	Calendar Year to Date
ARC	1	2
COS	2	4
DOD	0	2
ERL (SSC)	0	0
GSC	0	6
HQN	0	0
KSC	0	0
LAR	0	7
LEW	5	6
MFS	1	3
MSC	4	9
NPO	2	4
UGA	0	0
TOTAL	15	43

3. EVALUATION AND PUBLICATION

The program processing activities can be viewed as a three step process, although the steps are not necessarily done in sequence. These steps are program verification, program evaluation, and abstract preparation and publication.

Program verification represents the machine processing phase of evaluation and typically includes the compilation or assembly of supplied code using standard programming language translators followed by loading or linkage editing of the generated object code to insure completeness of the submitted code. This month COSMIC processed four programs through verification.

Program evaluation involves the review of programs and supporting documentation following the machine processing phase to determine their suitability for public release relative to the standards of completeness and content specified in the COSMIC Submittal Guidelines. Prices for distributed materials are also established during package evaluation. Factors considered in establishing the price charged for program code include the program source instruction counts as a gross measure of development effort, the machine independence or vintage, the quality of the supporting documentation, the known or assumed sales potential for the package, the functionality of the program relative to comparably classified packages, and the demonstrated level of developer programming support.

Seven programs completed the evaluation activity for the current month. Five were class 1, and two were class 3.

TABLE 3. SUMMARY EVALUATION TOTALS January, 1994 To Date

Submittal Site	Class 1	Class 2	Class 3	Class 4
ARC	0	0	1	1
COS	-	0	0	1
DOD	-	2	0	0
ERL	0	0	0	0
FRC	0	0	0	0
GSC	3	0	1	0
HQN	0	0	0	1
KSC	0	0	0	0
LAR	6	0	2	0
LEW	3	0	2	0
MFS	2	0	0	0
MSC	3	0	5	0
NPO	3	0	3	0
SSC	0	0	0	0
NUC	0	0	0	0
UGA	-	0	0	0
TOTALS	20	2	14	3

Publication activities carried out by COSMIC include the preparation of descriptive abstracts for all new submittal and updated Class 1 and 2 items evaluated each month as well as the preparation of Tech Briefs for the Class 1 packages for publication in the NASA Tech Brief Journal. Five Tech Briefs were prepared this month.

GSC-13631 - GAP 1.0 - Groove Analysis Program, Version 1.0

LEW-15891 - SUBTRANS - Subband/Transform MATLAB Functions for Image Processing

LEW-15919 - CSDM - COLD-SAT Dynamic Model

NPO-19307 - CASRE - Computer Aided Software Reliability Estimation

NPO-19348 - XOPPS - OEL Project Planner/Scheduler Tool

GAP 1.0 - GROOVE ANALYSIS PROGRAM, VERSION 1.0

GAP 1.0 is a comprehensive computer program designed to carry out a detailed performance analysis of an axially grooved heat pipe. The program incorporates the properties of 24 working fluids used in many different applications--from sensor cooling at cryogenic conditions to thermal management of hypersonic vehicles at elevated temperatures. Its predictions have been shown to correlate very well with performance data from two space flight experiments.

As a heat pipe design tool, GAP 1.0 can predict the steady state heat transport capability of an axially grooved heat pipe having a specified groove geometry and working fluid. The "capillary limit" is determined by the numerical solution of the differential equation for momentum conservation with appropriate boundary conditions. This governing equation accounts for the hydrodynamic losses due to friction in liquid and vapor flows and due to the liquid/vapor shear interaction. Back-pumping in both 0-g and 1-g environments is accounted for in the boundary condition at the condenser end. Slug formation in 0-g and puddle flow in 1-g are also considered in the model.

At the user's option, the program will perform the analysis for various fluid inventories (undercharge, nominal charge, overcharge, or a fixed fluid charge) and heat pipe elevations. It will also calculate the minimum required heat pipe wall thickness for pressure containment at a specified temperature, that can be greater than the critical temperature of the working fluid. The analysis is limited to uniform heat addition and removal with single evaporator and condenser sections. Distributed heat loads, asymmetric heat loads, preferentially filled grooves, and drainage are not included in the present analysis.

GAP 1.0 is written in ANSI FORTRAN 77 and Assembly language for IBM PC series or compatible computers running MS-DOS 3.3 or higher. This program is available in executable form only. GAP 1.0 requires the conventional 640K of RAM for execution, 600K of disk space for installation, an 80286 or higher CPU, and a math co-processor to handle high precision mathematical computations. The standard distribution medium for this program is a 3.5 inch 1.44Mb MS-DOS format diskette. GAP 1.0 is a 1993 update of a program originally developed in 1976.

SUBMITTED BY -

T.M. NGUYEN

J. KU

OAO CORP.

INQUIRIES CONCERNING THIS PROGRAM SHOULD BE ADDRESSED TO -

COSMIC

THE UNIVERSITY OF GEORGIA

382 EAST BROAD STREET

ATHENS, GA, 30602

SUBTRANS - SUBBAND/TRANSFORM MATLAB FUNCTIONS FOR IMAGE PROCESSING

SUBTRANS is a package of image data processing routines for use with MATLAB. These functions provide the capability to transform image data with block transforms (such as the Walsh Hadamard) and to produce spatial frequency subbands of the transformed data. Block transforms are equivalent to simple subband systems. Subband coding is a data processing technique which transforms an original signal into several frequency bands. The classic method uses a bank of digital filters to provide the frequency decomposition followed by decimators to reduce the total number of samples in all bands to the same (or nearly the same) number as the original signal. The low frequency subband is a low resolution version of the original image, while the higher frequency subbands contain edge information.

The SUBTRANS functions can be cascaded to provide further decomposition into more subbands. If the cascade is applied to all four of the first stage subands (in the case of a four band decomposition), a uniform structure of sixteen bands is obtained. If the cascade is applied only to the low frequency subband, an octave structure of seven bands results. SUBTRANS also contains functions for the inverse transforms.

SUBTRANS functions can be used in image data compression systems. The transforms do not produce data compression, but prepare the data for quantization and compression. Sample quantization functions for subbands are also included in the package. A typical compression approach is to subband the image data, quantize it, then use statistical coding (e.g. run-length coding followed by Huffman coding) for compression. Subbanding does not result in any data compression by itself, but it prepares the data for lossy compression using quantizer and statistical coders.

This software package consists of a group of functions written for use in the MATLAB mathematical analysis environment. (MATLAB is available from The MathWorks, Inc.) The package is compatible with MATLAB 386 running on IBM PC series and compatible computers, and will also work under the UNIX version of MATLAB. An electronic copy of the documentation is provided in WordPerfect 5.1 format. The standard distribution medium for this program is a 3.5 inch 1.44Mb MS-DOS format diskette. The contents of the diskette are compressed using the PKWARE archiving tools. The utility to unarchive the files, PKUNZIP.EXE v2.04g, is included. This package was developed in 1992.

SUBMITTED BY -

D. GLOVER

NASA LEWIS RESEARCH CENTER

INQUIRIES CONCERNING THIS PROGRAM SHOULD BE ADDRESSED TO -

COSMIC

THE UNIVERSITY OF GEORGIA

382 EAST BROAD STREET

ATHENS, GA, 30602

CSDM - COLD-SAT DYNAMIC MODEL

The COLD-SAT dynamic model (CSDM) is a six-degree-of-freedom, rigid-body computer simulation of a spacecraft in orbit around the Earth. The model was developed as part of a conceptual design review at the NASA Lewis Research Center to study the feasibility of a proposed spacecraft known as COLD-SAT (Cryogenic On-orbit Liquid Depot - Storage, Acquisition, and Transfer). The purpose of the COLD-SAT spacecraft is the investigation of the fluid dynamics and thermodynamics of subcritical cryogenic fluid in the microgravity environment.

The design of CSDM was shaped largely by the requirements of the COLD-SAT design study. This model was a major tool used throughout the study, primarily to evaluate and compare the performance of several attitude control system design options. Other areas of investigation in which the model was extensively employed were: the analysis of the microgravity environment within the liquid hydrogen tanks; the evaluation of the effects of prolonged periods of constant, low-level thrust on the spacecraft orbit over the 60-day mission life; and an assessment of the effects on the spacecraft dynamic behavior of liquid hydrogen sloshing in each of the three tanks. Although the development and design of CSDM was guided by the requirements of the design study, the model was written to be as general as possible so that its usefulness would extend to future projects as well as to COLD-SAT. To achieve this goal, approximations and simplifications were avoided to the maximum extent feasible.

The COLD-SAT model consists of three parts: a translation model, a rotation model, and a slosh model. The translation model simulates the motion of the spacecraft center of gravity about the Earth under the influence of gravitational force,

atmospheric drag, and the thrust produced by the axial thrusters and by the uncoupled control thrusters. The rotational model simulates the attitudinal motion of the spacecraft about its center of gravity under the influence of various disturbance torques and control torques acting on the spacecraft. The slosh model computes the torque on the spacecraft produced by the motion of the liquid hydrogen in any or all of the three tanks. In addition to the primary function of each part of the model, other computations are included as required. Thus, the translation model also computes the desired spacecraft attitude for a large number of attitude options, and it computes the torque resulting from the axial thrust misalignment acting on the spacecraft. The rotational model simulates the attitude control system and computes the microgravity environment within the spacecraft body.

COLD-SAT Dynamic Model is written in FORTRAN 77 and EASY5 script language, and is designed to be run on any platform running Boeing's EASY5 Dynamic Analysis package v3.4, or the equivalent Easy5/W workstation version (Boeing Computer Services; Seattle, Washington; Easy5 Hotline (800) 426-1443). Sample output files are included on the distribution medium. The standard distribution medium for this program is a 3.5 inch 1.44Mb MS-DOS format diskette. Alternate distribution media and formats are available upon request. CSDM was developed in 1992.

CSDM - COLD-SAT DYNAMIC MODEL

SUBMITTED BY -

N.S. ADAMS

G. BOLLENBACHER

ANALEX CORPORATION

INQUIRIES CONCERNING THIS PROGRAM SHOULD BE ADDRESSED TO -

COSMIC

THE UNIVERSITY OF GEORGIA

382 EAST BROAD STREET

ATHENS, GA, 30602

CASRE - COMPUTER AIDED SOFTWARE RELIABILITY ESTIMATION

Over the past 20 years, software reliability models have been developed that can be used to predict a software system's failure rate. These models can be useful management tools during the testing period, allowing developers to determine when the required reliability requirement for a software system has been achieved, estimate the time and effort required to achieve a reliability requirement, and quantitatively assess the impact of resource shortfalls during the testing period.

CASRE (Computer Aided Software Reliability Estimation) was developed as a software reliability measurement tool that is easier for non-specialists in reliability to use than many other currently-available tools. CASRE incorporates the mathematical modeling capabilities of the public domain tool SMERFS (Statistical Modeling and Estimation of Reliability Functions for Software), and runs in a Microsoft Windows environment. The command interface is menu driven; enabling and disabling of menu options guides users through the selection of a set of failure data, execution of a model, and analysis of model results. Input to the models is simultaneously displayed as text and as a high-resolution display that can be controlled to let users view the data in several different ways (e.g., time between successive failures, cumulative number of failures). Model predictions and statistical evaluations of a model's applicability may be superimposed on the plot of the data used as input to the model. CASRE also incorporates earlier findings - that prediction accuracy may be increased by combining the results of several models in a linear fashion. Users can define their own model combinations, store them as part of the tool's configuration, and execute them in the same way as any other model.

This tool would be particularly useful to software development organizations searching for ways to more effectively manage their development resources. Since CASRE has been designed with the non-specialist in mind, it should gain wider acceptance among managers and developers than those tools requiring detailed knowledge of the models.

CASRE is written in C-language for IBM PC series and compatible computers running MS-DOS v5.0 or higher. This program is available in executable form only. It requires 1Mb of disk space for installation and up to 64K of disk space for every failure history file. The minimum required environment for running CASRE is the following: an 80386 with 80387 coprocessor; Windows 3.1; 4Mb of RAM; a mouse, trackball, or equivalent pointing device; a 16 inch or larger VGA monitor; and a video card and printer supported by Windows 3.1. Although CASRE will execute with the above minimum environment, the recommended execution environment for CASRE is the following: a 66MHz 80486 DX/2 system; Windows 3.1; at least 8Mb of RAM; a mouse, trackball, or equivalent pointing device; a 19 inch VGA monitor; a video card supported by Windows 3.1; and a 300dpi or higher resolution laser-printer. CASRE may not function correctly on hardware using the local bus architecture. The standard distribution medium for CASRE is a 3.5 inch 1.44Mb MS-DOS format diskette. CASRE was developed in 1993 and is a copyrighted work with all copyright vested in NASA.

CASRE - COMPUTER AIDED SOFTWARE RELIABILITY ESTIMATION

SUBMITTED BY -

A.P. NIKORA

M.R. LYU

T.M. ANTCZAK

CAL TECH/JET PROPULSION LAB.

INQUIRIES CONCERNING THIS PROGRAM SHOULD BE ADDRESSED TO -

COSMIC

THE UNIVERSITY OF GEORGIA

382 EAST BROAD STREET

ATHENS, GA, 30602

XOPPS - OEL PROJECT PLANNER/SCHEDULER TOOL

XOPPS is a window-based object-oriented graphics tool for scheduling and project planning that provides easy and fast on-screen WYSIWYG editing capabilities. It has a drawing area which displays the full image of the schedule being edited. The drawing area contains a header area for text and a schedule area for plotting graphic representations of milestone objects in a flexible timeline. Each object on the screen can be treated as a unit for moving, editing, etc.

The schedule area has horizontal lines across the page with capabilities for multiple pages and for editing the number of lines per page as well as the line grid. The text on a line can be edited and a line can be moved with all objects on the line moving with it. The timeline display can be edited to plot any time period in a variety of formats from Fiscal year to Calendar Year and days to years. Text objects and image objects (rasterfiles and icons) can be created for placement anywhere on the page. Milestone event objects with a single associated date (and optional text and milestone symbol) and activity objects with start and end dates (and an optional completion date) have unique editing panels for entering data. A representation for schedule slips is also provided with the capability to automatically convert a milestone event to a slip. A milestone schedule on another computer can be saved to an ASCII file to be read by XOPPS. The program can print a schedule to a PostScript file. Dependencies between objects can also be displayed on the chart through the use of precedence lines.

This program is not intended to replace a commercial scheduling/project management program. Because XOPPS has an ASCII file interface it can be used in con-

junction with a project management tool to produce schedules with a quality appearance.

XOPPS is written in C-language for SunSparc series workstations running SunOS 4.1.x. This package requires MIT's X Window System, Version 11 Revision 4 or 5 and OSF/Motif 1.1.1 or greater. An executable and sample data files are included, however the executable may not run on all configurations. XOPPS requires 375K of RAM and 1.5Mb free disk space for execution. The standard distribution medium is a .25 inch streaming magnetic tape cartridge (Sun QIC-24) in UNIX tar format. XOPPS was developed in 1992, based on the Sunview version of OPPS (NPO-18439) developed in 1990. The present version of XOPPS was updated in 1993. It is a copyrighted work with all copyright vested in NASA.

SUBMITTED BY -

C.L. MULNIX

K.J. MILLER

CAL TECH/JET PROPULSION LAB.

INQUIRIES CONCERNING THIS PROGRAM SHOULD BE ADDRESSED TO -

COSMIC

THE UNIVERSITY OF GEORGIA

382 EAST BROAD STREET

ATHENS, GA, 30602

4. MARKETING

The marketing activities performed by COSMIC involve: promotion of COSMIC and computer programs available from COSMIC in the technical press and trade journals; attendance at trade shows and professional society meetings to promote the services and software available from COSMIC; utilization of various media for the general promotion of COSMIC; utilization of benefits analysis reports to highlight COSMIC's technology transfer function; and preparation of abstract collections and program summaries.

In April, COSMIC hosted the 22nd NASTRAN Users' Colloquium in San Diego, California. COSMIC also attended the NASTRAN Advisory Group meeting held immediately after the Colloquium.

The calendar of events follows.

May 10-11, 1994 **TABES**, Huntsville, AL

COSMIC: Exhibit

June 27-29, 1994 **T^2S Annual Meeting**, Huntsville, AL

Meeting Contact: Dick Snow

COSMIC: Attend

5. CUSTOMER SERVICE

Customer Service provided by COSMIC, in addition to the distribution of program code and documentation, includes responding to requests for information. These requests may be in the form of telephone calls, letters, Tech Briefs cards, mini-brochure cards, trade show return cards, or magazine inquiry cards. Generally the requested information concerns the services provided by COSMIC, or information on specific programs or groups of programs which may be available from COSMIC. This month, a total of 1808 information requests were processed. This was divided into 1751 domestic requests and 57 international requests. Of the domestic requests, 843 were responses to Tech Briefs and 13 were responses to press releases and paid ads, and 185 free catalogs were sent to card deck announcements (paid) and trade show visitors. In addition to the above, E-Mail new program announcements were sent to 2410 domestic E-Mail subscribers, and there were 487 sessions on the COSLINE information system, 2463 sessions from 548 unique machines on Worldwide Web, and 5113 sessions from 1600 machines on Gopher and 199 sessions on WAIS.

One other area of customer service is the response to requests for information relevant to problems associated with a particular program product installation. These requests are usually handled jointly with the Technical Service staff. After the customer problems have been resolved, a Problem Report Sheet is processed and added to the program package file for future reference. No problem reports were processed this month.

During the current month, a total of 105 customers representing 88 organizations received materials (program, documentation, or catalogs) from COSMIC. Customers represent individuals, whereas, organizations represent corporations or institutions. These customers are located in 21 different states or territories. Both NASA and non-NASA disseminations are reflected in these statistics.

6. BENEFITS IDENTIFICATION

COSMIC follows an active campaign of interviewing previous customers in order to ascertain the utility of distributed programs and identify specific benefits accruing to users of these programs. Additionally, contact with customers is used to evaluate the services provided by COSMIC. When notable benefits are identified, they are documented in reports written by COSMIC staff which are then approved for public release by the customers. No benefits report was released for publication this month.

7. MAINTENANCE AND SUPPORT

APRIL PROGRESS REPORT FOR NASTRAN MAINTENANCE

RPK's primary goal for April was to implement the in-memory data base on the VAX VMS platform and to attend and support the NASTRAN Colloquium. These goals were accomplished. The following is an itemization of the work accomplished during the month of April:

1. Testing and validation of the in-memory data base was completed on the VAX VMS computer.
2. The new user interface was developed for the VAX VMS system. The UNIX "nastran" shell script was re-written in FORTRAN and a flat file was used to pass data to NASTRAN instead of the use of environmental parameters.
3. The 1994 VAX VMS system is now validated and ready for release to COSMIC. The only item to be completed is the Supplemental Documentation.
4. The 1994 ULTRIX system is now validated and ready for release to COSMIC. The only item to be completed is the Supplemental Documentation.
5. The 1994 Generic UNIX system is now validated and ready for release to COSMIC. The only item to be completed is the Supplemental Documentation.
6. Work was begun on the Supplemental Documentation for the 1994 ULTRIX and Generic UNIX deliverables.
7. Support was given to Jay Malloy of Sterling Software (NASA/LeRC), to install the Generic UNIX version on an IBM RS6000 workstation. Problems with the AIX

operating system were found and another workstation had to be used. The installation on this second RS6000 workstation was successful.

8. Support was to NASTRAN users as follows:
   a. Provided information to four (4) potential lessees.
   b. Aided nine (9) lessees with problems that did not result in an SPR.
9. Attended the NASTRAN Colloquium. The following papers were presented:
   "Overview of the 1994 COSMIC Releases"
   "A Powerful Enhancement to the DMAP Alter Capability"
10. Work continued on installing the text files and the WordPerfect files for the new DMAP "INSERT" and "DELETE" commands that have been included in the 1994 releases.
11. A quarterly meeting was held with COSMIC. During this meeting, RPK reviewed the progress to-date of the maintenance contract and outlined plans for the delivery of the 1994 release of NASTRAN. COSMIC recommended that installation of the on-line support for submitting SPRs and for querying the SPR and NCL logs be delayed.
12. Three letters were sent to users as follows:
   a. Scott Zilmer - documenting the inclusion of the strain output for the QUAD4 and TRIA3 elements. (NCL 93-012).
   b. Jay Malloy - documenting changes required to install the Generic UNIX version on the SGI and the HP platforms.
   c. Jay Malloy - documenting a problem using the NASTPLOT utility program. (assigned SPR 93-032).

The following tasks are defined for the month of May:

1. Complete the supplemental documentation for the VAX VMS, DEC ULTRIX, and Generic UNIX platforms.
2. Update the NASINFO file with the 1994 release information.
3. Update the User's Manual text files and WordPerfect files for the new DMAP commands "INSERT" and "DELETE."
4. Deliver the 1994 VAX VMS, DEC ULTRIX and Generic UNIX releases to COSMIC.
5. Complete the 1994 HP release and deliver it to COSMIC.
6. Begin working on the 1994 release for the IBM MVS and SGI platform.
7. Continue to work on active SPRs.
8. Respond to users who call with problems.

If there are any questions, please call.

TABLE 4 TOTAL DISSEMINATIONS

ITEM	Current Month VOLUME	Current Month VALUE	Dec. 1, 1991 To Date VOLUME	Dec. 1, 1991 To Date VALUE
A. ITEMS INVOICED				
1. Programs	48	28,025.00	1789	1,127,732.50
2. Documentation	54	3,689.00	3021	203,060.00
3. Leases (Initial)	6	8,125.00	505	516,699.00
4. Leases (Renewals)	3	6,000.00	198	734,033.32
5. Leases (Misc.)	0	0	0	0
6. Catalogs	11	275.00	1245	37,343.00
7. Miscellaneous	10	624.75	668	88,861.77
TOTAL INVOICE		$46,738.75		$2,707,729.59
B. NASA (No Charge)				
1. Programs	37	32,100.00	849	904,274.00
2. Documentation	36	1,607.00	964	51,673.00
3. Leases (Initial)	4	15,750.00	205	419,000.00
4. Leases (Renewals)	3	10,000.00	109	460,000.00
5. Leases (Misc.)	0	0	0	0
6. Catalogs	0	0	1128	28,665.00
7. Miscellaneous	0	0	21	2,770.00
TOTAL NASA		$59,457.00		$1,866,382.00
C. OTHER (No Charge)				
1. Programs	1	350.00	124	134,725.00
2. Documentation	-1	-60.00	49	2,773.00
3. Leases	0	0	13	46,200.00
4. Catalogs	0	0	100	2,540.00
5. Miscellaneous	0	0	4	400.00
TOTAL OTHER		$290.00		$186,638.00
GRAND TOTAL DISSEMINATION		$106,485.75		$4,760,749.59

TABLE 5 NASTRAN DISSEMINATIONS

ITEM	Current Month VOLUME	Current Month VALUE	Dec. 1, 1991 To Date VOLUME	Dec. 1, 1991 To Date VALUE
A. ITEMS INVOICED				
1. Licenses Initial	0	0	9	30,300.00
2. Licenses Renewals	1	2,000.00	138	438,808.34
3. Licenses (Misc.)	0	0	0	0
4. Documentation	0	0	130	6,860.00
5. Miscellaneous	0	0	12	6,672.24
TOTAL NASTRAN INVOICED		$2,000.00		$482,640.58
B. NASA (No Charge)				
1. Licenses Initial	0	0	9	42,500.00
2. Licenses Renewals	2	6,000.00	72	280,000.00
3. Licenses (Misc.)	0	0	0	0
4. Documentation	0	0	39	2,540.00
5. Miscellaneous	0	0	0	0
TOTAL NASA NASTRAN		$6,000.00		$325,040.00
GRAND TOTAL NASTRAN		$8,000.00		$807,680.58

TABLE 6 DOD DISSEMINATIONS

ITEM	Current Month VOLUME	Current Month VALUE	Dec. 1, 1991 To Date VOLUME	Dec. 1, 1991 To Date VALUE
A. ITEMS INVOICED				
1. Programs	0	0	11	19,300.00
2. Documentation	0	0	29	1,143.00
3. Leases	0	0	13	2,600.00
TOTAL DOD		$0.00		$23,043.00

TABLE 7 FOREIGN DISSEMINATIONS

ITEM	Current Month VOLUME	Current Month VALUE	Dec. 1, 1991 To Date VOLUME	Dec. 1, 1991 To Date VALUE
A. ITEMS INVOICED				
1. Programs	12	14,500.00	335	449,650.00
2. Documentation	9	780.00	485	63,107.00
3. Leases (Initial)	0	0	46	139,850.00
4. Leases (Renewals)	0	0	32	175,849.98
5. Leases (Misc.)	0	0	0	0
6. Catalogs	0	0	130	7,460.00
7. Miscellaneous	1	49.00	114	25,180.65
TOTAL FOREIGN		$15,329.00		$861,097.63

FINANCIAL STATUS

NASW 4670

APRIL 1994

	CURRENT MONTH	CONTRACT TO DATE
Expense:		
Personnel	45,721.99	1,294,801.57
Staff Benefits	13,172.14	365,602.32
Travel	1,225.35	70,081.32
Equipment Purchases	0	27,613.95
Computer Time	265.92	10,825.34
Operating Expense	12,001.65	689,912.22
Program Maintenance	13,650.00	846,595.18
Overhead	17,080.10	594,369.83
Total Expense	103,117.15	3,899,801.73
Income:		
Sales Income	47,772.15	2,517,868.74
NASA Payments	31,208.33	1,624,082.65
Total Income	78,980.48	4,141,951.39
FINANCIAL STATUS:		
Income - Expense	(24,136.67)	242,149.66